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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/838,458	04/19/2001	Michael J. McNallan	27611/36440A	2100

4743 7590 05/05/2004

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EXAMINER

JOHNSON, JERRY D

ART UNIT PAPER NUMBER

1764

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/838,458	MCNALLAN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jerry D. Johnson	1764	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on January 5, 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-23 and 38-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-23 and 38-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 16-23 and 38-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNallan et al. "Formation of Carbon Coatings on Silicon Carbide by Reactions in Halogen Containing Media" in view of Cooper et al. (5,482,602).

McNallan et al. teach that carbon films on ceramic surfaces can be used for numerous applications in many fields of engineering. Examples of applications where these films can add value include reinforcing phases for ceramic matrix composites. The carbon films are applied by etching in halogen and hydrogen-containing gases for a time and temperature sufficient to provide essentially only diamond or diamond and carbon on said ceramic matrix.

Cooper et al. is relied on as teaching that diamond like carbon coatings having high wear resistance, high hardness, good corrosion resistance and chemical inertness (column 1, lines 16-34) may be deposited on the inner and outer raceways and/or bearing elements of a bearing assembly (column 4, lines 5-17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a surface layer as taught by McNallan et al. on a bearing surface as taught by Cooper et al. in order to improve the wear resistance, corrosion resistance and chemical inertness of said surface.

Claims 16-23 and 38-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gogotsi et al. "Carbon coatings on silicon carbide by reaction with chlorine-containing gases."

Gogotsi et al. teach that carbon films have been produced on the surface of SiC particles by reaction with Ar-Cl and Ar-Cl<sub>2</sub>-H<sub>2</sub> gas mixtures at atmospheric pressures and that graphitic

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and diamond films are used in tribology to decrease coefficients of friction and improve wear resistance of sliding parts. Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form a carbon film on a bearing surface as taught by Gogotsi et al.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-23 and 38-51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 16-23 and 38-51 it is unclear what is intended to be encompassed by the phrase “essentially diamond nanocrystal on the bearing surface of said metal carbide.”

Applicant's arguments filed January 5, 2004 have been fully considered but they are not persuasive.

Applicants argue

at the time of publication of the McNallan article, the sentence on the top of page 560 “An alternative method for formation of diamond or diamond like carbon films . . .” was speculative. In fact, at the end of the paragraph, it is positively stated that what is formed by the disclosed process is carbon: “This paper addresses the thermodynamics and kinetics of carbon formation on several metal carbide surfaces, which may be useful in MEMS devices.” (Remarks, page 7).

Applicants' argument lacks merit.

Initially it is noted that the McNallan article, cited as Item C4 on the information disclosure statement filed June 28, 2001, contains pages 256-268. The article specifically teaches “when the gas mixture also contains hydrogen in an appropriate ratio with chlorine,

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indications of nano- or microcrystalline diamond formation has been detected.” (Page 261, lines 1-4).

Applicants state a copy of page 337, HANDBOOK OF CARBON, GRAPHITE, DIAMOND AND FULLERENCES, by Hugh O. Pierson was submitted with applicants' response.

A copy of the above cited article has not been received by the Office. Additionally, an Information Disclosure Statement to make said article of reference has not been received.

Applicants argue

although diamond was detected in the experiments described in this paper, this paper does not show that a hard carbon surface (coating) containing nanocrystalline diamond can be produced by chlorination of silicon carbide monolithic bearing surfaces. The experiments performed in this work were performed on 1 micron  $\beta$  SiC powder, not on macroscopic components. (Remarks, page 8).

Applicants' argument lacks merit.

The teachings of Gogotsi et al. are not limited to forming nanocrystalline diamond on “1 micron  $\beta$  SiC powder,” i.e., Gogotsi et al. teach that carbon films have been produced on the surface of SiC particles by reaction with Ar-Cl and Ar-Cl<sub>2</sub>-H<sub>2</sub> gas mixtures at atmospheric pressures and that graphitic and diamond films are used in tribology to decrease coefficients of friction and improve wear resistance of sliding parts.

Applicants argue “diamond made up only a small fraction of the total reaction products. That small amounts of diamond were detected in these powders does not show that diamond-containing coating were produced on the SiC.”

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Applicants' claims are not limited to bearings containing a specific amount of diamond coated surface area. Accordingly, the claims are not distinguished from Gogotsi et al. on that basis.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

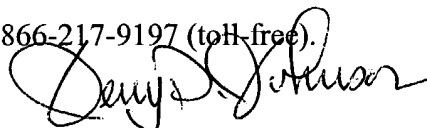
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry D. Johnson whose telephone number is (571) 272-1448. The examiner can normally be reached on 6:00-3:30, M-F, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glen Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jerry D. Johnson  
Primary Examiner  
Art Unit 1764